

| | | |
|---|-----------------------|------------------------------------|
| CH2M HILL Hanford Group, Inc. | Manual | ESHQ |
| EXCAVATING, TRENCHING, AND SHORING | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 1 of 18 |
| | Issue Date | February 17, 2004 |
| | Effective Date | February 17, 2004 |
| FUNCTIONAL AREA MANAGER: | | M. W. Elkins |
| DOCUMENT OWNER: | | R. E. DeBusk |

TABLE OF CONTENTS

| | | |
|-----|-------------------------------------|----|
| 1.0 | PURPOSE AND SCOPE | 2 |
| 2.0 | IMPLEMENTATION | 2 |
| 3.0 | RESPONSIBILITIES | 2 |
| 4.0 | PROCEDURE | 2 |
| 4.1 | Preparing for Excavation Work | 2 |
| 4.2 | Excavating/Trenching | 4 |
| 4.3 | Performing Machine Excavation | 9 |
| 4.4 | Providing Protective Systems | 9 |
| 5.0 | DEFINITIONS | 10 |
| 6.0 | RECORDS | 10 |
| 7.0 | SOURCES | 11 |
| 7.1 | Requirements | 11 |
| 7.2 | References | 11 |

TABLE OF FIGURES

| | | |
|-----------|----------------------------------|----|
| Figure 1. | Excavation/Shoring Process. | 13 |
|-----------|----------------------------------|----|

TABLE OF TABLES

| | | |
|----------|---|----|
| Table 1. | Electrical Safety Guidelines for Various Excavation Methods in the Tank Farms. | 14 |
|----------|---|----|

| | | |
|---|-----------------------|------------------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 2 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

1.0 PURPOSE AND SCOPE

(7.1.2)

This procedure prescribes the minimum safe work practices for protecting personnel working in and around excavations. These practices are applied as an integral part of the work planning and execution process through the Job Hazard Analysis ([TFC-ESHQ-S SAF-C-02](#)) and Work Planning ([TFC-OPS-MAINT-C-01](#)) processes to perform work safely.

Excavations include any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal. This procedure is not intended to address specific requirements relating to core drilling, sheet piling, driving rods or posts, or radiological soil sampling.

2.0 IMPLEMENTATION

This procedure is effective on the date shown in the header.

3.0 RESPONSIBILITIES

Responsibilities are contained within Section 4.0.

4.0 PROCEDURE

4.1 Preparing for Excavation Work

Completion of a Hazard Review Template is a part of the work planning and execution process. Refer to [TFC-OPS-MAINT-C-01](#) for the work control process.

- | | |
|--------------------|--|
| Manager/Supervisor | <ol style="list-style-type: none"> 1. Assign a competent person for excavation activities and document. 2. Before excavation is started, refer to and follow the instruction for the preparation and permitting process defined in HNF-PRO-090. <p style="margin-left: 40px;">NOTE: An Excavation Permit is required when excavating by mechanical means or when hand digging to a depth greater than twelve inches.</p> 3. Complete, as directed in HNF-PRO-090, the appropriate forms for the excavation work and include in the work package: <ol style="list-style-type: none"> a. Hanford Site Excavation Permit (A-7400-373) b. Request for Cultural and Ecological Resource Review c. Hanford NEPA Screening Form (A-6001-497). 4. Before the start of all excavation work, complete an excavation and scanning report and post the report at the excavation site for reference. <p style="margin-left: 40px;">NOTE: The scanning report includes current and/or approved scan data and the most current facility area drawings. This report is required for all excavations.</p> |
|--------------------|--|

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 3 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

5. Ensure subsurface scanning for underground obstructions has been completed no more than three months prior to the work being started.

NOTE: During work package preparation and review, scan reports might exceed three months. To add additional time (not to exceed three additional months) to the scan report, the facility system engineer can verify and validate the original scan (via walkdown, activity review, process knowledge, etc.). If an area of anomalies is too numerous to identify/pinpoint, the facility system engineer can validate the original scan report for the area of congestion only, for more than the additional three months.

NOTE: The Integrated Disposal Facility is exempt from this requirement. A geophysical analysis was conducted of the proposed Integrated Disposal Facility site in May 2001. Through aerial photography, actual site visits, and discussions with the current Fluor Hanford Landlord, no disturbance of this area has occurred since the original May 2001 geophysical analysis. Closure Projects will utilize existing analysis, along with aerial photography, and existing utility owners drawings to authorize excavation via an excavation permit.

6. Physically mark (on the ground surface) the location of any subsurface utility using the American Public Works Association's "Excavator's Damage Prevention Guide" for marking guidelines. (7.1.6)

NOTE: The use of an alternative color code system is permissible only if clearly posted at the excavated site.

7. Before opening an excavation, inform utility and/or facility owners of the planned excavation activities and the location 48 hours prior to the event.
8. At a minimum, follow the electrical safety guidance provided in Table 1.
9. If exposed to vehicular traffic, provide employees to act as flaggers.

NOTE: These employees must wear warning vests or other suitable safety clothing/garments marked with or made of reflectorized or high visibility material.

10. During the pre-job briefing (see [TFC-OPS-MAINT-C-02](#)) and the walkdown, discuss all requirements and special conditions in the excavation area. (7.1.7)
 - a. Whenever making an entry into an excavation of four feet or deeper, ensure an evaluation of the atmospheric hazard is performed by an Industrial Hygienist or an approved delegate. Also, ensure a confined space hazard identification is performed for excavations greater than four feet in accordance with [TFC-ESHQ-S_IH-C-04](#).

| | | |
|---|-----------------------|------------------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 4 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

- b. Designate one member of the work crew as the first aid provider. In the event the designated first aid provider is performing the excavation, designate an alternate. These personnel must remain within the immediate work area whenever excavation activities are being performed.
- c. Provide sufficient warnings (e.g., physical barriers and signage) at excavation sites to prevent exposure to passers-by.
- d. Provide fall protection for employees located near the edge of an excavation six feet or greater in depth.
- e. Provide a stairway, ladder, ramp, or other safe means of access and egress for all excavations four feet or greater in depth.

NOTE: Spacing of access and egress points must not cause employees to travel more than 25 feet (lateral travel).

- f. Provide mobile equipment operators working adjacent to excavations with a warning system through the use of stop logs, barricades, or signals when they do not have a clear and unobstructed view of the excavation edge and sloped away from the trench.
 - g. Notify the facility/utility owner of any damage or abnormal conditions relating to system installations, encountered during excavation work.
 - h. Establish communications with the operations personnel prior to initiating the excavation activity to ensure immediate shutdown of a waste transfer when leakage is detected. Refer to [HNF-SD-WM-TSR-006](#), AC 5.8.
11. Conduct initial radioactive or chemical monitoring of excavation materials/soil where the presence of unexplained moisture or salts is encountered.

NOTE: Arrangements are made for the necessary surveying of all potentially radioactive process piping that is exposed.

12. To safeguard employees, protect, support, or remove exposed underground installations (e.g., electrical, water, telecommunications, sewer, waste lines, fuel, gas, compressed air) while an excavation is open.

4.2 Excavating/Trenching

(7.1.1)

Competent Person

- 1. Before work starts, perform daily safety inspections of the excavation, adjacent areas, and protective systems for hazardous conditions. Also perform safety inspection after conditions change, after every

| | | |
|---|-----------------------|------------------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 5 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

rainstorm, and after any other potential hazard-increasing occurrence.
(7.1.3)

NOTE: The Daily Excavation/Trenches Safety Inspection Log ([A-6001-937](#)) can be used to document results of the inspection.

Operator

2. Excavate in accordance with the work package.

NOTE: Employees in excavations are protected from cave-ins through the use of protective systems (sloping, benching, shoring, shielding, etc.), unless otherwise determined by the competent person. (7.1.4)

- a. Stop excavation work in the area and contact the construction or project engineer for guidance if either of the following conditions exist:
 - Obstructions identified on drawings or permits are not found in the location indicated.
 - Field obstructions or conditions are encountered that were not pre-identified.
- b. Excavate by hand when within five feet of a known or suspected transfer line.
- c. Perform excavations using electrical safety precautions specified in the work package as outlined in Table 1 based on the excavation method to be used.

Competent Person

3. While excavation work is performed by the operator, use visual analysis and/or manual testing to classify soil and rock deposits as Type B, Type A, or stable rock where Type C compositions are being evaluated for a classification upgrade. (7.1.1)

NOTE: Appendix A of 29 CFR 1926, Subpart P, defines these three soil classifications.

- a. Determine how much to reduce a slope below the maximum allowable level when equipment, material, or personnel loads are imposed.
 - b. Evaluate excavations less than five feet deep for the application of a protective system.
4. When sloping is selected as the protective system method, slope the sides of excavations and trenches at an angle not steeper than 1-1/2 horizontal to 1 vertical in Type C soils. Otherwise, conform to the slopes and configurations detailed within Appendixes A and B of 29 CFR 1926.652, or other tabulated data or design approved by a

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 6 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

registered professional engineer. When sloping is not practical or feasible, use a support system (e.g., shoring or shielding) as follows.
(7.1.4)

- a. Determine the support system using Appendixes A, C, and D of 29 CFR 1926.652, manufacturer specifications, other tabulated data, or design approved by a registered professional engineer.
 - b. Ensure that materials and equipment used are in good condition, free from damage or defect.
 - c. Install and remove support systems so that employees are protected from cave-ins and structural collapses, and from being struck by members of the support system.
 - d. For trench excavations, excavate material two feet below the bottom of the members of a support system only when the system is designed to resist the forces for the full depth of the excavation and there is no indication of soil loss from behind or below the bottom of the support system.
 - e. When only the lower portion of a trench that is twenty feet or less in depth is shored and the remaining portion of the trench is sloped, construct the support system to support the vertical portion of a trench and extend above the top of the vertical side at least eighteen inches to prevent material from sliding into the trench. Clear the surface of the slope of boulders, stumps, hard masses of earth, tools, equipment, and other surface encumbrances.
 - f. Place timber cross braces or trench jacks in a true horizontal position, spaced vertically, and secured to prevent sliding, falling, or kick-outs. Place wales with the greater dimension horizontal.
 - g. Use engineering-approved portable trench boxes or sliding trench shields in accordance with manufacturer's recommendations.
5. While the excavation remains open, ~~work is performed~~, inspect the excavation and maintain daily inspection logs in the job file until the job is completed. The inspection must be performed prior to anyone entering into the excavation.
- a. When inspection reveals a situation that could result in cave-in, protective system failure, hazardous atmosphere, or similar hazardous condition, remove exposed employees from the area and initiate corrective action.

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 7 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

6. As needed, utilize equipment/structural ramps for use as a means of access or egress from an excavation. (7.1.3)

NOTE: As specified in 29 CFR 1926.651(c)(1)(I), the designer of equipment/structural ramps must be qualified in structural design.

7. Protect exposed employees from excavated material or equipment that pose a hazard of falling or rolling into an excavation by keeping materials and equipment at least two feet back from the edge of the excavation or by the use of retaining devices. (7.1.4)
8. If any damage or abnormal conditions relating to system installations are encountered, notify the supervisor, who is responsible for notifying the facility/utility owner.

Manager/Supervisor

9. Notify the facility/utility owner of damaged or abnormal conditions, as required.

WFO-Shift Manager

10. Prior to waste transfers, and at least once per 24 hours during a waste transfer, visually verify ~~by walking down the physically connected transfer route~~ that no excavation activities are in progress on physically connected transfer lines. (7.1.8~~40~~)

NOTE: Independent verification and documentation by the shift manager is not required if the excavation visual verification requirement is included in the transfer procedure. If it is not in the transfer procedure, the shift manager must document and track it.

11. Ensure excavation activities are identified within five feet of the associated transfer lines, then: (7.1.9~~40~~)
 - a. Ensure high radiation area access controls are in place around all exposed areas of the transfer line and/or shielding is in place to prevent the creation of an uncontrolled high radiation area.
 - b. Ensure a pre-job radiation survey is performed at the high radiation area boundary and excavated areas.
 - c. Ensure continuous health physics technician coverage is provided during excavation work.
 - d. Ensure a post-job radiation survey is performed at the high radiation area boundaries and excavated areas.

12. Ensure that covers or facility worker protection measures are in place over unburied (i.e., excavated) sections of encased waste transfer piping, as required by HNF-IP-1266, Section 5.11, Transfer Controls. ~~Ensure the following additional controls incorporate tank farm safety basis directed actions. (7.1.9~~40~~)~~

Covers are required for piping that is physically connected to an active waste transfer pump not under administrative lock, or to the 242-A

Evaporator vessel when it contains waste. Covers are not required over pipe-in-pipe waste transfer piping which is encased in concrete bedding that shows no visual signs of damage.

Covers or facility worker protection measures are required for piping that is physically disconnected by the use of valves as specified in HNF-IP-1266, Section 5.11, "Transfer Controls."

•Covers shall be in place over the unburied section of piping when this piping is physically connected to an active transfer pump not under administrative lock or to the 242-A Evaporator when it contains waste. The safety function of this cover is to reduce airborne releases from fine spray and splash and splatter due to waste transfer leaks in unburied sections of encased piping. The covers are not required to be leak tight but will provide a tortuous path for aerosols. Acceptable covers may include plywood, plastic, metal, etc., that are placed over the unburied piping and can withstand anticipated environmental conditions such as wind and snow loading.

•Covers shall be in place or radiation protection and hazardous material protection measures shall be established to protect facility workers from potential waste transfer leaks for unburied sections of encased transfer piping that are physically disconnected by one of the following methods:

—The use of two closed operable waste transfer system isolation valves;

OR

—The use of two closed waste transfer system valves;

OR

—The use of a closed valve pit isolation valve (for saltwell transfer systems only).

•Excavations which uncover transfer lines shall be limited to six months from the start of the excavation. Tracking of excavation durations shall be performed. Utilization of the shift manager red arrow process or the shift office status boards are acceptable methods of tracking.

NOTE: Configurations where there is a pipe in pipe transfer line which is encased in concrete bedding (e.g., replacement cross site transfer system) that show no visual signs of damage do not require compensatory measures.

NOTE: Excavations that uncover encased transfer lines shall be limited to six months from the start of the excavation. This requirement does not apply to pipe-in-pipe waste transfer piping which is encased in concrete bedding that shows no visual sign of damage. (7.1.9)

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 9 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

Tracking of excavation durations shall be performed. Utilization of the shift manager red arrow process or the shift office status boards are acceptable methods of tracking.

4.3 Performing Machine Excavation (7.1.1)

Construction/
Responsible Project
Engineer

1. If the permit allows machine excavation, comply with the following:

- a. Do not excavate closer than five feet from underground utilities.

NOTE 1: If a marked utility is completely exposed through pot-holing using techniques that would not damage electrical insulation or conduit (such as hand digging or air/vacuum excavation), the requirement for hand digging within two feet either side may be waived by the facility/system owner.

NOTE 2: The responsible engineering organization provides written direction for any exceptions to this requirement.

- b. Consult Utilities Operations when planning to operate equipment within twenty horizontal feet from energized overhead high voltage power lines.

NOTE: Safe working distances from overhead power lines:

| | | | |
|------|--------|---------|-------|
| | 0 to | 50 kV | 10 ft |
| Over | 50 to | 200 kV | 15 ft |
| Over | 200 to | 350 kV | 20 ft |
| Over | 350 to | 500 kV | 25 ft |
| Over | 500 to | 750 kV | 35 ft |
| Over | 750 to | 1000 kV | 45 ft |

4.4 Providing Protective Systems (7.1.4)

A registered professional engineer must be used for protective systems design when manufacturer's tabulated data are not used while working within the appropriate discipline and is used for design approval of protective systems.

Construction/
Responsible Project
Engineer

1. Protect employees in excavations from cave-ins by use of protective systems except when:
 - Excavations are made entirely in stable rock
 - Excavations are less than five feet in depth and examination of soil conditions by the competent person does not indicate a potential for cave-in.
2. Design protective systems for excavations deeper than twenty feet and obtain approval from a registered professional engineer.

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 10 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

3. Provide shoring, bracing, or underpinning to ensure the stability of adjoining structures that may be endangered by an excavation to shift or collapse. These structures include, but are not limited to:
 - Buildings and walls
 - Sidewalks/pavement
 - Concrete encased raceways, piping, etc.
 - Storage tanks
 - Power poles
 - HVAC skids
 - Electrical and instrumentation enclosures and supports.
4. Provide a walkway or bridge with standard guardrails if employees or equipment must cross over an excavation.

5.0 DEFINITIONS

Competent person. Is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. A competent person is designated in writing by management.

Concrete density fill. A hard, concrete like substance used as backfill to eliminate the need for compaction.

Machine excavation. Employs the use of mechanized excavation equipment (e.g., backhoe, trackhoe, excavator, etc.) that makes it difficult to prevent damage to buried cables, conduit, and pipes. This type of equipment is normally operated and controlled from a cab or enclosure that is not located directly over or at the excavation point. Excavation using the “Guzzler” vacuum excavator is not considered machine excavating.

Pot-holing. A method for locating buried utilities and lines using techniques that would not damage electrical insulation or conduit.

6.0 RECORDS

The following records are generated during the performance of this procedure:

- Hanford Site Excavation Permit ([A-7400-373](#))
- Hanford NEPA Screening Form ([A-6001-497](#))
- Daily Excavation/Trenches Safety Inspection Log ([A-6001-937](#)).

The work planner is responsible for record retention and retirement in accordance with TFC-BSM-IRM_DC-C-02.

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 11 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

7.0 SOURCES

7.1 Requirements

1. 29 CFR 1926, Subpart P, "Excavations." (S/RID)
2. 29 CFR 1926.650, "Scope, application, and definitions applicable to this subpart."
3. 29 CFR 1926.651, "Specific Excavation Requirements."
4. 29 CFR 1926.652, "Requirements for Protective Systems."
5. ANSI/ASTM D120-95, "Standard Specification For Rubber Insulating Gloves."
6. American Public Works Association (APWA), "Excavator's Damage Prevention Guide," (1997).
7. [HNF-SD-WM-TSR-006](#), "Tank Farms Technical Safety Requirements," Administrative Controls 5.8, "Emergency Preparedness."
8. ~~Approval of the Tank Farms Safety Basis Justification for Continued Operation (JCO) 002," 03 TED0 118, dated November 14, 2003.~~
9. ~~"Justification for Continued Operation to Permit Transfers with Sections of Buried Encased Transfer Piping Exposed due to Planned Excavations," CH2M 0304490, dated November 14, 2003.~~
8. PER-2003-3563.
9. [HNF-SD-WM-TSR-006](#), "Tank Farms Technical Safety Requirements," Administrative Controls 5.11, "Transfer Controls."

7.2 References

1. [HNF-PRO-090](#), "Excavating, Trenching and Shoring."
2. [TFC-BSM-IRM_DC-C-02](#), "Records Management."
3. [TFC-ESHQ-S_IH-C-04](#), "Confined Space."
4. [TFC-ESHQ-S_SAF-C-02](#), "Job Hazard Analysis."
5. [TFC-OPS-MAINT-C-01](#), "Tank Farm Contractor Work Control."
6. [TFC-OPS-MAINT-C-02](#), "Pre-Job Briefing."
7. [TFC-OPS-MAINT-C-05](#), "Predictive Maintenance."

| | | |
|------------------------------------|----------------|-----------------------------|
| ESHQ | Document | TFC-ESHQ-S_IS-C-03, REV B-4 |
| | Page | 12 of 18 |
| EXCAVATING, TRENCHING, AND SHORING | Effective Date | February 17, 2004 |

8. [TFC-OPS-OPER-C-05](#), “Lockout/Tagout Program.”

9. [HNF-IP-1266, “Tank Farm Operations Administrative Controls.”](#)

Figure 1. Excavation/Shoring Process.

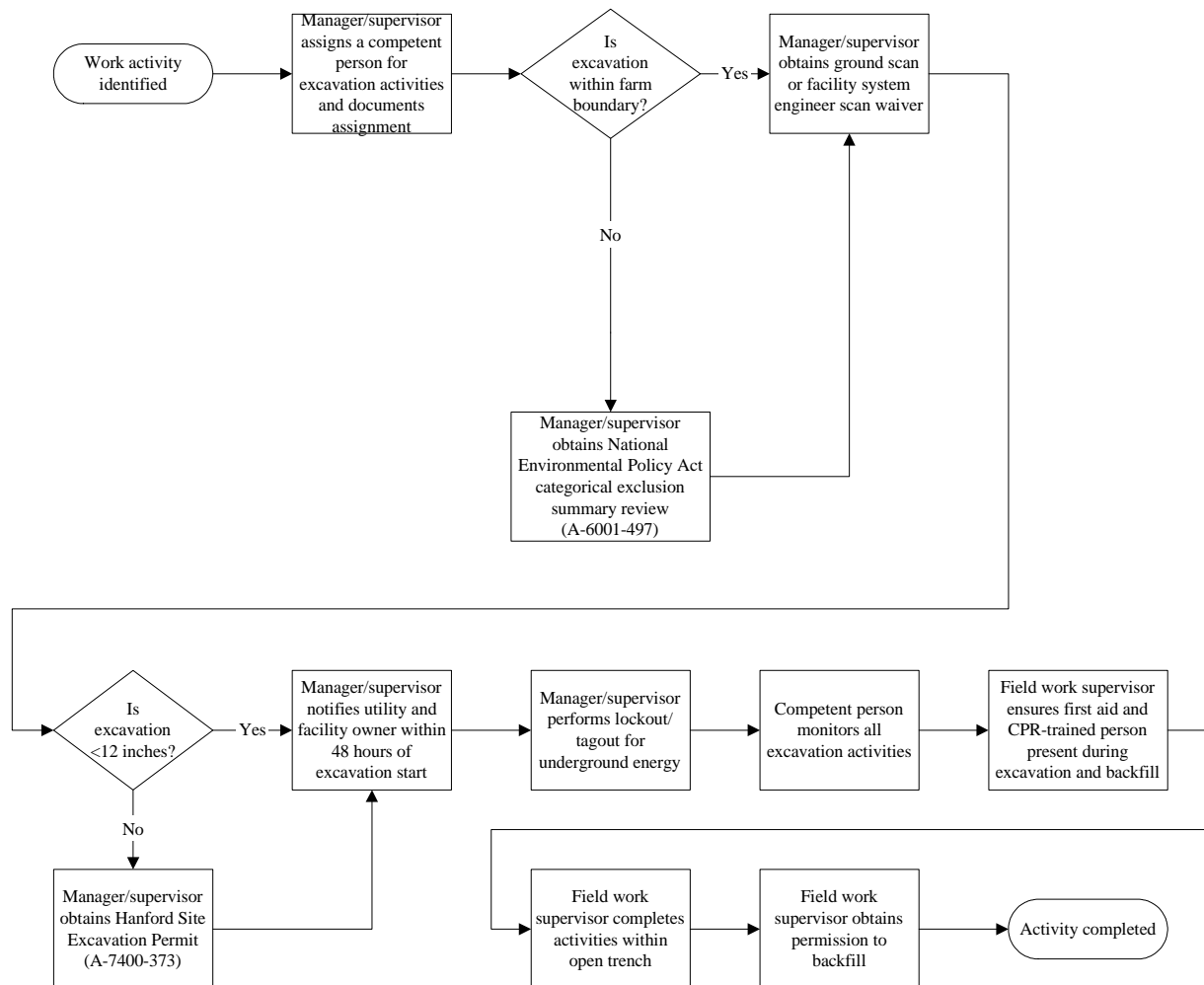


Table 1. Electrical Safety Guidelines for Various Excavation Methods in the Tank Farms.

(7.1.5)

| Method | Preparation | Electrical Precaution |
|--|--|---|
| <p>Hand Tools</p> <p>Ground scan and engineering drawings indicate NO direct buried energized cables</p> <ul style="list-style-type: none"> • Applicable inside and outside of the tank farm boundaries for excavating greater than two feet from buried utilities. • Use of roto-hammer or equivalent method is authorized. • Digging through concrete density fill (CDF) requires that electrical cables be deenergized. These methods may need to be so aggressive that preventing damage to buried cable and conduit is unlikely. For this reason, excavation through CDF requires that electrical cables be deenergized. When it has been determined by the Facility Operations manager that deenergizing will introduce additional risk or is not feasible, justification for not deenergizing the electrical circuits or conductors shall be entered in the work plan/package by the Facility Operations manager prior to starting the job. | <ul style="list-style-type: none"> • Ground scan performed and ground marked to show locations of buried obstructions, including energized direct buried electrical cables. • Approved Excavation Permit for excavations twelve inches or greater. • Requires ground scans and drawing review. • Work package prepared and approved in accordance with TFC-OPS-MAINT-C-01. • Work package released. | <ul style="list-style-type: none"> • Energized electrical cable in conduit need not be deenergized with this method except when digging through CDF. • Use only non-conductive hand tools. • Workers performing excavation shall wear voltage rated gloves with protective outer gloves (training required). See http://www.rl.gov/boards/hesp/hesphome.htm. • During excavation activities, periodically verify suspected cable locations with hand-held detection equipment or other acceptable means of locating utility installations. |

Table 1. Electrical Safety Guidance for Various Excavation Methods in the Tank Farms. (cont.)

| Method | Preparation | Electrical Precaution |
|--|---|--|
| <p>Hand Tools</p> <p>Ground scan or engineering drawings indicate direct buried cable.</p> <ul style="list-style-type: none"> • Applicable inside and outside tank farm boundaries for excavating greater than two feet from buried utilities. • Use of the roto-hammer, pry bar, striking tool, or equivalent method is NOT authorized. • Digging through CDF requires that electrical cables be deenergized. These methods may need to be so aggressive that preventing damage to buried cable and conduit is unlikely. For this reason, excavation through CDF requires that electrical cables be deenergized. When it has been determined by the Facility Operations manager that deenergizing will introduce additional risk or is not feasible, justification for not deenergizing the electrical circuits or conductors shall be entered in the work plan/package by the Facility Operations manager prior to starting the job. | <ul style="list-style-type: none"> • Ground scan performed and ground marked to show locations of buried obstructions, including energized buried electrical cables. • Approved Excavation Permit for excavations twelve inches or greater. • Requires ground scans and drawing review. • Work package prepared and approved in accordance with TFC-OPS-MAINT-C-01. • Work package released. | <ul style="list-style-type: none"> • Apply lockout/tagout to electrical cables unless it has been determined by the Facility Operations manager that deenergizing will introduce additional risk or is not feasible. Justification for not deenergizing the electrical circuits or conductors in the excavating path shall be entered in the work plan/ package by the Facility Operations manager prior to starting the job. • Use only non-conductive hand tools. Use of a pry bar or striking tool is not allowed. • Workers performing excavation shall wear voltage rated gloves with protective outer gloves (training required). See http://www.rl.gov/boards/hesp/hesphome.htm. • If a direct buried cable needs to be moved for any reason, have an electrician handle the cable. If the insulation is found to be compromised (worn or damaged) during this handling process, take corrective actions to protect the workers and notify the responsible project engineer or field work supervisor. • During excavation activities, periodically verify suspected cable locations with hand-held detection equipment or other acceptable means of locating utility installations. |

Table 1. Electrical Safety Guidance for Various Excavation Methods in the Tank Farms. (cont.)

| Method | Preparation | Electrical Precaution |
|------------------|---|--|
| | | <ul style="list-style-type: none"> Mark energized direct buried electrical cable uncovered by excavation with red tape or red paint. |
| Vacuum (Guzzler) | <ul style="list-style-type: none"> Ground scan performed and ground marked to show locations of buried obstructions, including energized direct buried electrical cables. Approved Excavation Permit required for excavations twelve inches or greater. Requires ground scans and drawing review. Work package prepared and approved in accordance with TFC-OPS-MAINT-C-01. Work package released. | <ul style="list-style-type: none"> Use only non-conductive nozzles in the vicinity (within two feet) of energized electrical lines and non-conductive tools to loosen/remove soil. Utilize techniques that will not damage electrical cable insulation or conduit. Use of a pry bar or striking tool is not allowed in the vicinity of direct buried energized electrical lines. Workers performing excavation shall wear voltage rated gloves with protective outer gloves (training required). See http://www.rl.gov/boards/hesp/hesphome.htm If a direct buried cable needs to be moved for any reason, have an electrician handle the cable. If the insulation is found to be compromised (worn or damaged) during this handling process, take corrective actions to protect the workers and notify the responsible project engineer or field work supervisor. During the excavation activities, periodically verify suspected cable locations with hand-held detection equipment or other acceptable means of locating utility installations. |

Table 1. Electrical Safety Guidance for Various Excavation Methods in the Tank Farms. (cont.)

| Method | Preparation | Electrical Precaution |
|---|---|---|
| | | <ul style="list-style-type: none"> Energized electrical cable installed in conduit or direct buried cable need not be deenergized with this method. Mark energized direct buried electrical cable uncovered by excavation with red tape or red paint. |
| Machine Excavation <ul style="list-style-type: none"> Used only outside of tank farms. Must be greater than five feet from waste transfer pipelines. | <ul style="list-style-type: none"> Ground scan performed and ground marked to show locations of buried obstructions, including energized direct buried electrical cables. Approved Excavation Permit required for excavations twelve inches or greater. Requires ground scans and drawing review. Work package prepared and approved in accordance with TFC-OPS-MAINT-C-01. Work package released. | <ul style="list-style-type: none"> Do not excavate closer than two feet from underground utilities. However, if a marked utility is completely exposed through pot-holing with non-invasive excavation methods, such as hand digging or vacuum excavation, the requirement for not excavating within two feet of underground utilities may be waived by the facility/systems owner. The waiver shall be documented in the work package. Apply lockout/tagout to electrical cables unless it has been determined by the Facility Operations manager that deenergizing will introduce additional risk or is not feasible. Justification for not deenergizing the electrical circuits or conductors in the excavating path shall be entered in the work plan/package by the Facility Operations manager prior to starting the job. |

Table 1. Electrical Safety Guidance for Various Excavation Methods in the Tank Farms. (cont.)

| Method | Preparation | Electrical Precaution |
|--------|-------------|---|
| | | <ul style="list-style-type: none">Workers performing excavation shall wear voltage rated gloves with protective outer gloves (training required). See http://www.rl.gov/boards/hesp/hesphome.htm.If a direct buried cable needs to be moved for any reason, have an electrician handle the cable. If the insulation is found to be compromised (worn or damaged) during this handling process, take corrective actions to protect the workers and notify the responsible project engineer or field work supervisor.During the excavation activities, periodically verify suspected cable locations with hand-held detection equipment or other acceptable means of locating utility installations. |